



Case Report

Thread-Embedding Therapy for Knee Osteoarthritis

Jeong-Du Roh*

Department of Acupuncture and Moxibustion, Semyung University College of Korean Medicine, Jecheon, Korea



ABSTRACT

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The aim of this study was to investigate the efficacy of thread-embedding therapy for the treatment of knee osteoarthritis. There were 20 patients treated with thread-embedding therapy at various acupoints on the muscles around the knee. Gender, age, location, morbidity period, numeric rating scale (NRS), Western Ontario and McMaster Universities (WOMAC) index, improvement result, side effects, and patient's satisfaction were investigated. After the treatment, the NRS score ($z = -4.07, p < 0.001$) and WOMAC ($p < 0.001$) indices decreased in most patients. The NRS score decreased by more than 2 points in 95% of the patients. The WOMAC index decreased by 6-12 points. There were no serious side effects, although bruising, pain, and edema were observed. Overall, 85% of the patients felt satisfied with the thread-embedding therapy. These findings suggested that thread-embedding therapy was effective and may be used widely for knee osteoarthritis.

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Introduction

Knee osteoarthritis is the most common type of arthritis. In this condition, the articular cartilage, which protects the articular surface or the ends of bones, wears away revealing the underlying cartilage. This causes inflammation in the synovium surrounding the joint, and there is pain, and deformation of the affected joints [1].

The most common symptom of knee osteoarthritis is pain in the knee whilst going up and down the stairs. The pain may be more severe in the afternoon when compared to the morning. Other symptoms include fatigue, movement disorder of the joint, pressure pain around the joint, and frictional sound during exercise. The knee becomes swollen as the pain progresses and this continues throughout the day [2].

Conservative treatments used in modern medicine include weight loss, muscle strengthening exercises, analgesics, nonsteroidal anti-inflammatory drugs, intra-articular steroid injections, and hyaluronic acid injections. If conservative treatments are not effective, knee replacement arthroplasty may be performed [3].

Traditional Korean medicine offers several therapies to treat knee osteoarthritis, such as acupuncture [4], herbal medicine

[5], pharmacopuncture [6], miniscalpel acupuncture [7], and fire needling [8].

Thread-embedding therapy is a acupoint point burial therapy or a medication thread burial therapy. The embedded medical thread remains under the skin, melts slowly, and stimulates the tissue longer than acupuncture therapies. It is used in the treatment of several diseases [9].

A few studies [10,11] have reported on thread-embedding therapy as a treatment for knee osteoarthritis. Therefore, we applied the thread-embedding therapy to more knee osteoarthritis patients, studied prospectively and reported these cases.

Case Report

Patients

This study involved 20 patients who had been diagnosed with knee osteoarthritis in a radiology department before visiting the Acupuncture and Moxibustion Department at the Semyung University Hospital of Korean Medicine, Korea. Patients treated from March 1, 2017 to February 28, 2018, were included in this study. All patients agreed to participate in the study, after having the objectives, procedures, and possible adverse reactions explained

*Corresponding author. Jeong-Du Roh
Department of Acupuncture and Moxibustion, Semyung University College of Korean Medicine, Jecheon, Korea
E-mail: wsrohmi@hanmail.net
ORCID: Jeong-Du Roh <https://orcid.org/0000-0002-5512-6765>

to them. The exclusion criteria included patients suffering from knee arthroplasty, cerebrovascular accident, hypersensitivity or active skin disease, active infectious disease requiring medical care for the entire body, mental disease, alcoholism, and drug addiction. The protocol was approved by the Institutional Review Board of Semyung university hospital (SMJOH -2017-07).

Treatment methods

Thread-embedding therapy

Medical threads for embedding therapy were purchased from Dongbang Acupuncture, Inc., Korea. The specifications of the medical thread were 3 cm in length and 29-gauge, with a generalized smooth form.

The procedure areas were based on Acupuncture Medicine acupoints, such as Dokbi (ST35), Naeseuran (LE200), Yanggu (ST34), Hyeolhae (SP10), Seuryanggwon (GB33), Yangneungcheon (GB34), Joksamni (ST36), Eumneungcheon (SP9), Eumgok (KI10), Gokcheon (LR8), Wiyang (BL39), Wijung (BL40), and A-shi point. The muscles selected were iliotibial band, sartorius, quadriceps femoris, adductor magnus, gracilis, hamstring, popliteus, gastrocnemius, and soleus.

The operator used sterilized gloves and the medical thread was inserted parallel to the direction of the muscle. Thread-embedding therapy was performed once a day fortnightly, using approximately 2-4 embedding threads in each muscle. The number of embedded medical threads differed based on the degree of symptoms. The treatment was performed twice per patient.

Acupuncture treatment

Following thread-embedding therapy, acupuncture treatment was performed at the above-mentioned acupoints around the knee using disposable, stainless-steel filiform needles (0.30 × 40 mm, Dongbang Acupuncture, Inc., Korea). 12-24 acupuncture needles were inserted to a depth of 5-15 mm, and the retaining time for acupuncture was 15 minutes. Thread-embedding therapy and acupuncture treatment were performed by the same operator more than 10 years of Korean medicine clinical experience.

Physiotherapy

Infrared rays were applied during acupuncture. After thread-embedding therapy and acupuncture, a hot pack was applied for 15 minutes, followed by interferential current therapy for 10 minutes, on the painful part of the knee.

Investigation analytical methods

The general characteristics of patients and effectiveness of thread-embedding therapy were investigated based upon the analysis of gender and age, areas of knee osteoarthritis, onset of knee osteoarthritis, numeric rating scale (NRS) scores, Western Ontario and McMaster Universities (WOMAC) index [12], side effects, and patient's satisfaction. The NRS and WOMAC indices were evaluated before the treatment, 2 weeks after the first treatment, and 2 weeks after the second treatment.

The Wilcoxon signed-rank test or paired *t* test was performed using SPSS (18.0 version, Windows operating system). Improvement was described as excellent (patients felt > 70% improvement), improved (30-70% improvement), mildly improved (< 30% improvement), or failure (no improvement). The presence and types of side effects, such as bruising, pain, and edema were surveyed. Patient satisfaction was described as very satisfied, satisfied, neutral, dissatisfied, and very dissatisfied.

Results

In this study, twenty patients (five men and fifteen women) with knee osteoarthritis were analyzed. The age and sex distributions are shown in Table 1.

Knee osteoarthritis affected the left (five patients), right (eleven patients), and both knees (four patients) (Table 2).

In total, five patients reported the symptoms within 6 months of the onset, eleven within 6-12 months, and four after > 12 months from the onset (Table 3).

Prior to the treatment, three, six, nine, and two patients expressed NRS grades 8, 7, 6 and 5, respectively (Table 4). After treatment, while two patients expressed grades 7 and 6 each, two,

Table 1. Patient Characteristics.

Age (y)	Male	Female	Total
61-70	5	12	17
71	0	3	3
Total (mean ± SD)	5 (65.6 ± 3.36)	15 (66.93 ± 3.22)	20 (66.6 ± 3.21)

Table 2. Distribution of Knee Osteoarthritis Locations.

Pain location	Left	Right	Both
No. of patients	5	11	4

Table 3. Distribution of Morbidity Period with Knee Osteoarthritis.

Morbidity period	≤ 6 mo	6-12 mo	> 12 mo
No. of patients	5	11	4

Table 4. NRS Score Before and After Treatment.

NRS score before treatment (No. of patients)	NRS score after treatment					
	7	6	5	4	3	2
8 (3)	1	1	1			
7 (6)			1	5		
6 (9)				5	4	
5 (2)					1	1
Total (20)	1	1	2	10	5	1
Mean \pm SD (6.5 \pm 0.89)	Mean \pm SD (4.0 \pm 1.12)					

NRS, numeric rating scale.

Table 5. WOMAC Index Change After Treatment.

WOMAC index before treatment (No. of patients)	WOMAC index of after treatment		
	51-60	41-50	31-40
61-70 (3)	3		
51-60 (6)		5	1
41-50 (11)			11
Total (20)	3	5	11
Mean \pm SD (49.6 \pm 7.24)	Mean \pm SD (40.4 \pm 6.78)		

WOMAC, Western Ontario and McMaster Universities.

ten, five, and one of these patients expressed grades 5, 4, 3 and 2 respectively. Before and after the treatment, the mean (\pm SD) NRS changed from 6.5 \pm 5.89 to 4.0 \pm 0.12 (Table 4). The Wilcoxon signed-rank test identified a significant decrease in NRS ($z = -4.07$, $p < 0.001$).

Before the treatment, three, six, and eleven patients showed a WOMAC index score of 61-70, 51-60, and 41-50, respectively, whereas after the treatment, three, five, and twelve patients showed a WOMAC index score of 51-60, 41-50, and 31-40, respectively. The mean \pm standard deviation of WOMAC before and after treatment decreased significantly from 49.6 \pm 9.6 d to 40.4 \pm 0.4 d (paired t-test, $p < 0.001$, Table 5).

With regard to improved results, six patients expressed their condition as excellent, eight as improved, and six as mildly improved. During the total 40 treatment sessions, side effects were recorded 11 times, focal bruises six times, focal pain four times, and local edema one time. Overall, twelve patients were very much satisfied with the thread-embedding therapy (60%), five were satisfied (25%), two were normal (10%), and one patient was dissatisfied (5%).

Discussion

Knee joints are the most common joints affected by degenerative arthritis. Knee osteoarthritis usually occurs above the age of 55 years. The joint pain slowly appears early during an activity,

however during later stages of the condition, it also occurs at rest.

The aim of the treatment of knee osteoarthritis was to improve the quality of life, and control the pain. It was reported that the pain of arthritis was closely related to the weakening of the muscular strength of the femoral quadriceps [14], therefore the femoral quadriceps should be strengthened.

Research has been performed on treating knee arthritis using Korean Medicine treatment [4-8] and medical guidelines [16].

Thread-embedding therapy is a treatment that is often used in oriental medicine. This therapy is used for beauty, pain, paralysis and internal medicine diseases [9,17]. Many studies have reported using thread-embedding therapy. However, studies on osteoarthritis in the knee are lacking.

In this study 20 cases of osteoarthritis in the knee were treated with thread-embedding therapy. There was a high proportion of females ($n = 15$) to males ($n = 5$) in this study. The average age of all the patients was 66.6 \pm 3.21 years, the average age of male patients was 65.6 \pm 3.36 years, and the average age of female patients was 66.93 \pm 3.22 years.

Knee osteoarthritis affected the right knee in 11 patients, the left knee in 5 patients, and both knees in 4 patients. Since right-handedness is much more common than left-handedness, more people use the right lower limb than the left. This may be a possible explanation for observing more knee osteoarthritis cases of the right knee.

All patients were diagnosed with knee osteoarthritis in the radiology department before visiting this hospital. On average, most patients visited this hospital within 8 months of their diagnosis, some came within 2 months, and some came after 24 months of radiological diagnosis.

Before treatment, the average NRS score was 6.5 \pm 0.89, with 3 patients who initially presented with NRS score 8, 6 patients had a score of 7, 9 patients had a score of 6, and 2 patients had a score of 5. After 2 treatments, the average NRS score was 4.0 \pm 0.89, which had significantly decreased compared to before the treatment. While NRS scores of some patients decreased to a score of 2, some patients had only slight decreases after treatment.

In WOMAC indices before treatment, the average WOMAC indices was 49.6 \pm 7.24, 3 patients presented with an index of 61-70 points, 6 had 51-60 points, and 11 had 41-50 points. After 2 sessions of the treatment, the average WOMAC index value was 40.4 \pm 6.78 which was significantly decreased compared with before treatment.

The side effects (local bruises, pain, and edema) occurred 11

times (27.5%) out of 40 treatment sessions, however, most of them disappeared within 1-2 weeks. Furthermore, 85% patients were satisfied with this treatment.

Although we think the thread-embedding therapy is effective in the treatment of knee osteoarthritis, it is a condition that requires long-term management. Therefore, it is difficult to evaluate the effectiveness of this treatment through studies of short duration. Furthermore, the number of cases in this study was small; therefore, it is difficult to confirm the statistical significance of the results. In the future, larger studies on various treatments, including thread-embedding therapy for knee osteoarthritis, are needed with longer periods of treatment and follow-up periods.

Conflicts of Interest

The author has no conflicts of interest to declare.

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